

### REMARKS/ARGUMENTS

In the February 25, 2005, Non-Final Office Action, claims 1-10 were rejected. In the present response, claims 1 and 3 were amended to correct typographical errors. Claim 5 was amended to remove the "preferably" clauses that were inadvertently copied from the specification. Claim 9 was amended to remove the dependency from itself. Thus, claims 1-10 are pending. No new matter was added.

#### ***Rejections Under 35 U.S.C. § 112, 2<sup>nd</sup> Paragraph***

Claims 5 and 9 were rejected under 35 U.S.C. § 112, 2<sup>nd</sup> paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner asserted that, in claim 5, the "words 'preferably' on line 5 and 9 should not be recited in the claim." The Examiner also asserted that claim 9 depended on itself. As noted above, Applicants have corrected the aforementioned errors and thus respectfully submit that the rejections under section 112, 2<sup>nd</sup> paragraph, have been obviated.

#### ***Rejections Under 35 U.S.C. § 103(a)***

Claims 1-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Brookhart *et al.* (U.S. Patent No. 6,103,946) in view of Bearden *et al.* (U.S. Patent No. 3,574,782). Applicants respectfully traverse these rejections.

As stated by the Examiner, Brookhart *et al.* are silent about plug flow reactors, and Bearden *et al.* do indeed describe a process for making  $\alpha$ -olefins from ethylene using a plug flow reactor. There are many important differences, however, between the catalysts and processes described in Brookhart *et al.*, Bearden *et al.*, and the present claims.

Bearden *et al.* describe a process in which titanium compounds are contacted with an aluminum alkyl compound, a phosphine, and ethylene in a polar (halogenated) solvent at a temperature of less than 75 °C (see Abstract). As would be well known in the art (references can be supplied if needed), the titanium compound of Bearden *et al.* is clearly a variation of a Ziegler-Natta olefin polymerization catalyst. The variation is the need for a phosphine, which apparently results in purer  $\alpha$ -olefin product (see column 1, line 61 – column 2, line 8). As is well

known in the art, catalysts of the Ziegler-Natta type are not unimolecular (a single transition metal atom in a catalytic moiety) catalysts such as metallocenes, but are clusters of transition metal atoms of unknown size.

Contrarily, the catalyst used in the present process (and described by Brookhart *et al.*) is a unimolecular, well-defined, iron complex which is contacted with an alkyl aluminum compound, preferably in a hydrocarbon solvent (see page 14, lines 3-5, of the present application), which is generally non-polar. The process is performed at a temperature of about 40 °C to about 120 °C. At these temperatures, particularly in the higher part of this range, the half-life of the catalyst may be (very) short.

Applicants also point out that, at the time of filing of the present application, it was known that an "efficient" continuous stirred tank ("CSTR") process for the production of  $\alpha$ -olefins described in U.S. Patent Publication No. 2002/0016521 (now U.S. Patent No. 6,534,691) existed, so the need or desirability of a plug flow reactor process for this catalyst was *not* apparent, because a good CSTR process for producing  $\alpha$ -olefins had already been described.

Thus, Applicants respectfully submit that there are many differences between the present catalyst and the Bearden *et al.* process. For this reason, a *prima facie* case of obviousness has not been established, because there was no incentive to combine Brookhart *et al.* with Bearden *et al.* Applicants also submit that there was an element of hindsight reconstruction in combining these references for, while Bearden *et al.* disclose making  $\alpha$ -olefins, the reference has no other connection with Brookhart *et al.*, except for the fact that the Examiner knew, after reading the present application, that a plug flow process was useful for the catalysts described by Brookhart *et al.*

Even if, *arguendo*, a *prima facie* case of obviousness has been made, Applicants respectfully submit that the present invention is not obvious over Brookhart *et al.* in view of Bearden *et al.* The differences between the catalysts of the present invention and Bearden *et al.* are significant, and even if one of ordinary skill in the art were to *try* a plug flow reactor, the results of such a process would be in doubt. For example, one of ordinary skill in the art would not know whether the  $\alpha$ -olefins produced were pure, whether the productivity of the catalyst was satisfactory,

or whether the process was operable over long time periods. Because obvious to try is not a valid test for patentability, *In re Geiger*, 815 F.2d 686, 688 (Fed. Cir. 1987), the combination of references does not make these claims obvious.

Further, as the Examiner has apparently recognized, neither of the cited references refers in any manner to a plug flow reactor in which catalyst is added along the length of the reactor (put another way, added to the liquid flowing along the reactor). Strictly speaking, in a plug flow reactor, all of the ingredients are added at zero time (upon entering the reactor) and these ingredients flow as a "plug", that is, without back mixing, as they flow down the reactor to emerge at the end. Addition of ingredients during a reaction is more typical of a type of semibatch reactor, which, however, is also usually back mixed, that is, a reactor wherein the ingredients are all mixed and some ingredient are added while the reaction is taking place. In fact, the presently claimed process, with its additions along the plug flow reactor, is not at all described in Bearden *et al.* The Examiner asserted that it would be easy to modify the process of Brookhart *et al.* to add these addition points, but Applicants note that Brookhart *et al.* does not describe a plug flow reactor. It is apparently the Examiner's *opinion* that it would have been obvious to carry out such a modification. An opinion, however, is not evidence of obviousness, and the Examiner is requested to provide evidence (an affidavit or reference) to show that it would have been obvious to use such addition points. Otherwise, Applicants contend that a showing of obviousness for the totality of their claimed process has not been made.

Because claims 2-10 are dependent claims, which recite even further limitations to the claim that has already been traversed, Applicants rely upon the arguments presented above in rebuttal to the Examiner's assertion that claims 2-10 are unpatentable over Brookhart *et al.* in view of Bearden *et al.*

### ***Summary***

In view of the foregoing amendments and remarks, Applicants submit that this application is in condition for allowance. In order to expedite disposition of this case, the Examiner is invited to contact Applicants' representative at the telephone number below to resolve any remaining issues. Should there be a fee due which is not

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accounted for, please charge such fee to Deposit Account No. 04-1928 (E.I. du Pont de Nemours and Company).

Respectfully submitted,

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